

Belfast
With the Authors
Compts.

CONTRIBUTIONS
TO THE
PRACTICAL SURGERY
OF
NEW GROWTHS OR TUMOURS.

SERIES VI.
CARTILAGINOUS AND BONY GROWTHS.
(CONTINUED.)

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From Guy's Hospital Reports 1860.

IN the volume of these 'Reports' published in 1866 I related several cases of cartilaginous growths developed in immediate relation with the bones of the skeleton; thus forming tumours composed of cartilage, and springing from the surface, or in close relation with the cancellous texture, of otherwise healthy bones.

We may, therefore, now proceed to the examination of tumours containing cartilage developed in the connective tissue, and which are formed either between the organs of the body, or within the organs themselves.

Cartilage is met with in new growths formed upon or within the parotid and submaxillary glands, in the neck, in some other superficial and deeply-seated parts of the body, in the testis, ovary, breast (?), lachrymal gland, and the lungs.

Cartilaginous parotid tumours.—The most common sites of these new growths containing cartilage are the sides of the face

and the neck, in the regions occupied by the parotid and sub-maxillary glands. They are developed on the outside of these organs as well as between the lobes composing them. Hence their common designation cartilaginous parotid tumours.

The structure of these tumours differs very materially from that of those large masses of cartilage described in Series V. In many of those the entire substance of the tumour was found to be cartilage. In these that tissue is disposed in an almost granular form, in many instances, or in small nodules held together by a very characteristic fibre-tissue. The cartilage sometimes shows, when examined with the microscope, all its ordinary features, and very often the stellate-figured cells, whilst the outline of the fibre-tissue is not like that of the connective or filamentous, but appears much finer, straight, and sharply defined in single threads, crossing each other in different directions. The cartilage is often very sparingly dispersed throughout the tumour, or may even abound in one part of it and be scarcely recognisable in another. As a rule it does not appear more distinctly, as if it were more perfectly formed, in the centre than in the superficial regions of the growth; nor have I been able to ascertain any definite relation between the age of the growth and the formation of the cartilage it may contain. In several old large tumours, after some years' development, the structure in the centre did not vary in any essential points from that composing the surface, or that of half an inch in depth within its outermost limits. And in young, small, recently observed growths, removed within a year after the first notice made of them, the minute elementary composition was not different from the structure of the older ones.

The slow growth of these tumours is illustrated by the specimen in the museum, 1654⁸⁴, presented by Mr. Price, of Deptford. It is of fibro-cartilaginous texture, was growing beneath the lower jaw in a man seventy-six years old; the commencement of it was noticed twenty-seven years before his death.

Another specimen, prep. 1539⁵⁰, measuring about five and a half inches by five, with a thickness of about four inches, grew on the right side of the neck of a man for thirty-six years, and was successfully removed by Sir A. Cooper when the patient was sixty years old. That operation was performed in 1806.

The man left the hospital in a month afterwards quite well. It is recorded that the tumour extended from the lobe of the ear, which was involved in it, as far forwards as the maxillary artery (facial?), where it crosses the jaw, and inferiorly to the clavicle. It was perfectly moveable, gave no pain, and had increased during the last two years as much as during the whole period. The structure is granular, its outside is very irregular, and it appears to be breaking up in its centre. The vessels on the surface were of considerable size, and required a ligature as soon as divided (Old Museum Book, No. 71).

A second specimen (prep. 1540), also successfully removed by Sir A. Cooper from beneath the lower jaw, was of formidable proportions; as the cast (208) shows that the tumour occupied the entire right side of the neck, reaching from the horizontal ramus of the lower jaw to the clavicle. Its surface is extremely nodulated. It measures six inches by six transversely and vertically, and is about five inches thick. A section shows that the nodular appearance is only superficial, and is not an indication of a lobulated internal structure.

The record of these successful operations is highly interesting: for in the days when they were performed, and without chloroform, the undertaking must have been regarded as most formidable.

The following case is another example of one of these tumours, and the illustration to this paper, Plate I, is a copy of the original drawing by Canton. It shows remarkably well the irregular outline of the surface of these growths, the pendulous appearance they assume when of large size, and the perfectly healthy texture of the integuments; the only change being that which cannot be delineated here, a deeper tint of red due to vascular congestion or turgescence of the superficial veins. This case is illustrated by prep. 1541⁶⁰, and drawing 51, and the history is copied from a record in the 6th 'Green Inspection Book,' p. 105, by Dr. Hodgkin.

A married woman, æt. 48, was admitted on 11th July, 1828, under the care of Mr. Morgan, with a very large tumour at the right side of the face and neck. It was first noticed about fifteen years prior to her admission, and when she was about thirty-three years old. It was hard, moveable, and of small size, in which state it remained nearly or quite stationary till about

the last two years, during which time it increased rapidly in spite of the means employed to check it, of which the assiduous use of iodine was the principal. The size and situation of the tumour as it appeared when she was in the hospital will be best understood from an inspection of the cast 210, and drawing (see Plate I). It was equal to, or even exceeded the size of the patient's head. Its attachment was broad, extending from the ear, which it displaced to a considerable distance down the neck, and from beneath the jaw to the back part of the neck. It was but slightly moveable. Its surface was nodulous or tuberosc. The integuments though stretched were not discoloured, except that the prominent parts were marked by numerous finely injected vessels. Some of these prominent parts on examination with the finger excited the idea that they contained fluid. Some doubts were entertained respecting the malignant nature of the tumour. From its character it pretty evidently possessed a structure dependent on cysts. There was a diversity of opinion as to the propriety of attempting its removal, but it caused so much inconvenience to the patient that she desired the operation, which Mr. Morgan determined to attempt as soon as the state of the health would allow it. From the extensive attachments of this tumour, and still more from the importance of the parts over which it was situated, the operation necessarily occupied a considerable time, but it was dexterously effected with very little loss of blood. With the exception of a small part of the parotid gland deeply situated between the mastoid process and the jaw every portion of suspicious structure was removed.

Before the operation the patient was habitually thirsty, and subsequently to it this symptom continuing made her urgent in her calls for drink. She drank little but water and tea, but of these she was not content with sips, but took a sufficient quantity to excite vomiting, which was relieved by an opiate, but frequently showed a disposition to return. The febrile excitement which accompanied it to a great degree subsided, the bowels were relieved by injection, and for several days the patient seemed to be doing remarkably well, the wound had a promising appearance, and Mary Jones was allowed to quit the room, which she had had to herself, and return to the ward.

Her appetite, both for solid and liquid food, was very un-

manageable. Diarrhœa came on, which was mainly to be attributed to error in diet, and she was carried off on the eighth day after the operation.

The account of the necropsy is in the words of Dr. Hodgkin. The head was not examined.

Adhesion had made considerable progress in the wound; the thin layer of coagulum which partially existed between the flap of the integument and the muscles was of a dark colour, but firm and strongly adherent.

Chest.—Both pleuræ were nearly or quite free from adhesion. On the right lung were some small, very superficial, white spots, which were probably allied to the tumour. The substance of both lungs was of a light colour, and not at all speckled with black pulmonary matter. The air-cells were somewhat dilated. The heart and pericardium were healthy.

Abdomen.—The peritoneum offered nothing remarkable except a very few small white lardaceous tubercles upon the intestines and mesentery. The mucous membrane of the stomach was generally of a pale ash colour, with a little dendritic injection. It was somewhat thickened. That of the duodenum pale with some partial dendritic injection, that of the rest of the small intestines generally healthy. In the large intestines it was pale, but thin and extremely soft, so as to admit of its being separated in the form of mucus under the pressure of the finger. The other viscera presented nothing requiring notice.

Tumour.—The tumour on being laid open presented a large cavity filled with a thin, dirty brown fluid; the sides of the cavity were of the same colour, they were very ragged, and presented numerous tender membranous cells, which were evidently the remains of broken-down cells which had lost their vitality. The parietes varied in thickness from one inch to upwards of two; they were generally of a light whitish colour, and evidently made up of cysts containing smaller cysts mostly filled with a fine lardaceous substance, but in several there was a clear, colourless, ropy mucus. Some of the membranous cysts were highly vascular. The inferior order of cysts were so tender and adherent among themselves, and the substance which they contained was so dense, but friable, that they did not afford the best specimen on which the structure could be shown.

The following cases have been admitted into the hospital

more recently, and although of diminutive dimensions in comparison with those already described, are striking examples of these growths.

CASE 1.—A woman, æt. 48 years, residing in the provinces, who had always enjoyed good health, was admitted into Dorcas, under the care of Mr. Cock, in 1854. Fourteen years since she felt a swelling in the right side of the face, just in front of the ear, which slowly increased at first, but more rapidly the last two or three years. The whole of the right parotid region was deformed by a tumour superficially situated, with an exceedingly irregular nodulated surface. It gave no pain—not even when pressed. Through a single vertical incision of the integuments Mr. Cock enucleated the tumour from its delicate capsule; very little bleeding occurred. The growth extended from the malar bone above, to the lower border of the horizontal ramus of the lower jaw below. A section through its longest axis measured four inches, transversely it was two and a half inches.

The nodulated external surface was very characteristic, but the section exhibited a uniform smooth internal construction, without lobulation. It was of a pearly hue, and very bloodless. It was composed of fibre tissue and nodules of cartilage. The drawing in the museum, 197⁷⁷, depicts the external surface of the tumour and a surface section with great fidelity.

CASE 2.—H. S., æt. 29, a labouring man, was admitted into Naaman ward under my care on account of a tumour in the left parotid region. It was very hard, slightly lobulated, moveable and painless. He attributed its origin to a blow received thirteen or fourteen years before. The tumour was first observed twelve years since, had slowly increased, and even now was merely unsightly. It covered the whole parotid gland. Excision was performed, and the wound soon healed. The growth was not deeply seated, but enclosed in a very strong fibrous capsule. It measured about one and a half inch by one inch.

Its section was smooth, homogeneous, and of a pearly hue when first cut; but exposure to the action of the air soon changed its surface to a pale red tint. The minute elementary composition of the growth was an abundance of a delicate fibre tissue, with interspersed islets of granular cartilage.

A drawing, 1977⁶, and the preparation, 1784³⁵, in the museum at Guy's, afford good illustrations of this kind of growth.

CASE 3.—A healthy-looking woman, æt. 27, was in Dorcas ward, under the treatment of Mr. Cock, in 1862. Seven years before admission she observed a swelling below the right angle of the lower jaw. It gradually enlarged, caused no pain, became more and more nodulated upon its surface, and at last proved inconvenient and very unsightly. The tumour was very moveable, firm, and but slightly attached to the surrounding parts. At the lower border there seemed to be a cystiform development. Mr. Cock excised the growth.

The drawing in the museum, 51²⁰, and preparation, 1539²⁵, illustrate very forcibly the characteristic nodulation of the cutaneous surface of these new growths. The section demonstrates that these nodules are not represented by deep lobulation of the substance of the tumour, for it shows a nearly uniform, smooth, homogeneous surface, bright and glistening when recently cut, and here and there of a pearly aspect. This appearance is due to the small nodules of cartilage. Its length was about four and a half inches, its greatest breadth two and a half inches. The minute elements were fibre tissue and cartilage. Well-marked cysts containing a blood-tinged serous fluid were seen at the extremity of the growth where the presence of fluid had been detected before its enucleation.

CASE 4.—A lady, æt. 20, consulted me on account of a swelling in front of the left ear, which had been slowly increasing four or five years. It gave no pain, but produced a visible elevation of the integument, which was, however, perfectly healthy. It was first accidentally felt at about the age of fifteen. The firm, nodulated structure of the tumour, combined with its mobility, rendered the diagnostication of its composition easy. Excision was effected, and the wound healed in forty-eight hours. The new growth was about an inch in its longest diameter. It was loosely attached to a delicate fibrous envelope, from which it was easily separated with the handle of the scalpel. Its elementary composition was fibre tissue, with minute points of cartilage interspersed throughout.

CASE 5.—In September, 1857, a girl, *æt.* 16 years only, was admitted into my ward on account of a tumour situated behind the left angle of the lower jaw, over the parotid gland, the progress of which had been watched for five or six years. Thus the growth was first noticed at the early age of between five and six years. After its excision it was found to be composed of a granular cartilage held together by fibre tissue.

CASE 6.—A similar case was admitted into my ward in February, 1858, the girl being 17 years old, and the tumour three years. The growth was enclosed in a rather distinct cyst, and was quite superficial.

These cases, and other preparations and drawings in the museum (prep. 1361⁴⁶; drawing, 197⁷⁸; and preparation, 1361⁴⁷), afford good examples of the origin, progress, and treatment of the fibro-cartilaginous tumours so commonly met with in the parotid or sub-maxillary regions. They are generally developed at early periods of life; their growth is slow, attended with scarcely any inconvenience until they reach a large size, and they are harmless as regards any hurtful influence on the structures in their vicinity.

They may be readily recognised by their nodulated surface, for even when very small they are remarkable by this feature; and by this characteristic they may be distinguished from an enlarged lymphatic gland, which is usually particularly regular in its outline. Sometimes seated superficially to the parotid, at other times apparently commencing between its lobes, they are more or less firmly and intimately confined within the limits of the fibrous envelope of the gland, according to these conditions. And the chief importance of this fact is with regard to the section of some of the glandular structure in the operation of excision, when partially encompassed by the gland lobules. For, should the minute ducts be divided, a fistulous opening might remain when all the rest of the wound is healed. The opening may be excessively minute, only just visible, but yet sufficient to be inconvenient, by allowing the escape of saliva during every act of mastication. Such tiny apertures will sometimes close and remain so for months, and re-open at intervals, for many years subsequent to these incisions of the salivary glands.

The only method by which to eradicate these tumours is excision. This operation should be always undertaken when the growth is small, especially as in the early stage a very small incision is required, and the facility of detaching the new formation is remarkable in comparison with that of older ones. A single vertical incision of the integument is alone necessary ; the capsule should be carefully incised along the superficial surface of the tumour, and to about $\frac{1}{16}$ of an inch in depth into it, in the same direction, and the handle of the scalpel may be successfully employed to enucleate it with the occasional assistance of a few touches with the blade to divide the more resisting fibres. The surface of the wound should not be touched with any foreign body, but the blood expressed by gentle pressure at its sides, and the bleeding arrested by cold applied to the neighbouring parts. The wound ought not to be finally dressed until the entire cessation of the flow of blood. Then its edges may be maintained in contact with plaster made adhesive by resin or albumen, an opening being carefully left at the lowest edge, a graduated compress applied over it, and union by adhesion may be obtained in twenty-four hours.

When the entire growth has been completely removed a favorable prognosis may be anticipated.

Cartilage in the testicle.—This tissue is frequently met with in some of the new growths affecting the testis. For many years there has been a specimen in the museum in which this gland appears to be changed into an entire mass of cartilage. The preparation is numbered 2362, and is quoted by John Müller in his work. I remember Mr. Key stating that the patient from whom it was removed died subsequently of cancer ; and there is at the lower part of the section, as it hangs in the bottle, one portion of the surface which resembles the structure of cancer after long immersion in spirit. The shape of the testis, in section, is still well preserved, the new growth is entirely circumscribed by the tunica albuginea, and its longest diameter measures about three inches.

But cartilage does not commonly form so uniform and regular a growth in this organ. It is most commonly disposed in nodules, or even in tiny granules, interspersed with fibre-tissue,

cysts, strumous deposit, and soft cancer. The following cases illustrate such an arrangement :

CASE 1.—In 1854 I assisted Mr. Cock, who removed the left testis of a gentleman between thirty-nine and forty years of age, and whose general health was somewhat impaired. He had observed for five months slow but progressive increase in size of the affected organ, which he attributed to a hurt. The shape of the organ was not changed, it was simply larger than the other, but at one spot, where a puncture had been made with a trocar, some sprouting granulations had appeared. It was hard and resisting in all parts, with that elasticity peculiar to a distended tunica albuginea. The inferior division of the spermatic cord was slightly enlarged, and the deeper seated iliac glands were rather more distinctly felt than when in a perfectly healthy state. The testis and about an inch of the cord were removed. The disease was entirely confined to the body of the organ, stretching the tunica albuginea and bursting through it. The epididymis was healthy, merely spread over the testis. The tubuli testis were not traceable. The new growth was composed of cysts, cartilage, and a material which looked like strumous deposit, which was really dead cancer tissue. The patient subsequently died of abdominal cancer. Drawing 416⁵².

CASE 2.—A man, æt. 39, was admitted under Mr. Key in January, 1849, on account of disease of the right testis, to which his notice had been attracted about two months. He was a hard working man, and had had angular curvature of the spine from boyhood, resulting from a cured abscess in the back. Over the surface of the testis were hard and soft points. The former spots were like cartilage, the latter as if fluid was contained in cysts. The organ was about double its normal size, and there was not any unusual accumulation of serum in the tunica vaginalis. It was not painful, nor had he pains in the loins. His general health was as good as usual. One of the soft spots was punctured, but no fluid escaped. The tumour slowly increased, and in March Mr. Key removed it. The spermatic cord was quite healthy, and the disease was confined entirely to the body of the testis; the epididymis was expanded.

The softer structures were considered to be cancerous, and the hard were cartilage. The wound healed favorably, and the man left the hospital. In October following the man began to complain of pain in the loins, which increased slowly; his liver enlarged from carcinoma; he became dropsical, and died the following year.

CASE 3.—The various forms which cartilage tissue assumes in association with other new growths in this organ are well displayed in other preparations and drawings in the museum. Preparation 2362⁷⁰, and a drawing 417⁶¹, made whilst it was fresh, show a large and fine example, with masses of cancer, of the nature of which there could be no question. The cartilage tissue is also well marked, and very characteristic, especially at the border of the tumour. In this are also a few cysts.

CASE 4.—Another specimen, preparation 2362⁹⁰, drawing 417⁶⁰, shows quite a different arrangement of the cartilage growth, which is mixed with much tough fibre-tissue. The small nodules of cartilage are arranged in patches. The tumour is large, was very hard, and did not seem to be associated with any cancer growth. It was removed by Mr. Cock in November, 1862, from a patient thirty years old, in the enjoyment of otherwise good health, and it had been growing about six months.

Cartilage and bone may be found in tumours developed in the connective tissue, between the muscles, without any traceable connection with the osseous system at the time of their removal.

CASE 1.—A very beautiful specimen in the museum of such a tumour, removed by Mr. Key from the neck of a young woman, composed of fibro-cartilage and bone, is about three inches by two and a half inches in its vertical and transverse diameters. It possesses a rather smooth, regular external surface. The section shows, to use the words of Dr. Wilks, "a bony shell, which is very dense, and sends processes inwards, and between these there is a tough fibro-cartilaginous tissue.

It differs from ordinary forms of bony growths." Catalogue of museum, preparation 1361, and a very beautiful coloured drawing by Canton, No. 37¹⁰.

CASE 2.—Another highly interesting specimen in the museum, 1399⁵⁰, consists of an osteo-chondromatous growth on the surface of a healthy, adult heart. A drawing of this was made in October, 1856, 38²⁰, for it is an old specimen, without a history, and was obtained at the sale of Mr. Brooke's collection.

CASE 3.—A curious tumour, composed principally of fat, it is true, but with nodules of cartilage interspersed throughout it, was removed by Mr. Key in 1848. The specimen, preparation 1652⁸⁷, is about two inches by three in diameter, has not very irregular surfaces, and the section shows projecting nodules of cartilage in fibre-tissue, containing much fat. The patient from whom this was removed was a healthy woman, about twenty-five to thirty years old, in good health. It was growing in the posterior region of the upper third of the leg, between the gastrocnemius and soleus muscles.

CASE 4.—An isolated mass, of large size, composed of more bone than cartilage, was developed in the posterior femoral region of a woman, from whom I removed it in February, 1858. The history of this singular case is from notes taken by Mr. Buckmaster J. Tuck. A married and prolific woman, the wife of a working man, felt, accidentally, in the twenty-eighth year of her age, a firm hard "kernel." It was then about two inches in diameter, and in the posterior, outer, femoro-popliteal region of the left leg.

She was under my treatment when the tumour had been growing about two years and four months. Occasionally she felt aching and shooting pains in the part after exertion. Its increase had been slow and steady. The general health was good; the lymphatic glands were not affected; there was no history of inherited tendency to new growths, nor was the patient disposed to attribute the formation to any assignable cause.

The tumour was situated close to the inside of the short head of the biceps femoris muscle, and extended inwards towards the inner hamstring muscles. It projected slightly backwards, causing

a general fulness of the popliteal space. It was beneath the fascia, and the artery passed along its inner side. The skin over it was quite healthy and not discoloured, although a few cutaneous veins were slightly varicose. Not the slightest attachment to the femur could be discovered; on the contrary, when the muscles were quite relaxed, the tumour was moveable in every direction to a limited extent. It resisted strong pressure, which caused no pain; and from the touch it could only be considered of bony texture. Its surface was quite smooth. The patient was anxious to have the tumour removed, as it was becoming inconvenient from its size. I made, therefore, a vertical incision directly over the centre of the growth, and carefully detached the fibrous envelope by which it was invested from its surface. The excision was easily effected without seeing any of the neighbouring structures except a few fibres of the short head of the biceps, and with a very trivial loss of blood. The wound speedily healed, and the patient was never afterwards troubled in that region. In the early part of 1860 she became phthisical, and died in May, 1861, three years and three months after the operation. There were no visible signs of tumours in any part of the body, but it is to be regretted that a post-mortem was not made. I did not hear of the woman's death until some months after that event.

The tumour, preparation 1376³⁵, was so hard that a saw was required for its section, but there was much cartilage interspersed with the bone. Its outer surface was tolerably regular, and there was neither a bony nor cartilaginous outside casing, but both tissues were mingled together without apparent order or marked arrangement. The osseous element preponderated. The section when recent had a greyish, pearly tint. About two thirds of the tumour consisted of bone, which was densely compact in some parts and cancellated in others. A delicate envelope of fibre tissue surrounded the whole. It measured five inches in vertical diameter, three in the transverse, and about two and a half from front to back.

The conversion of an ordinary ganglion or bursa on the sheaths of tendons into a growth of fibre-tissue, cartilage and bone cannot be very common, as I have only met with one case of the kind. The following are the details:

CASE 5.—A lady, æt. 22, showed me a tumour on the dorsal aspect of the left carpus, which had been growing there for eleven years. It was exceedingly hard, movable, projecting, and unsightly, although painless. Being composed of several nodules, its outline was irregular, and its long axis extended obliquely over the tendons of the two extensors of the wrist-joint. One nodule felt softer and more yielding than any of the others, and might have been taken for a very tense bursal cyst. With the assistance of Mr. Frederick J. Toulmin I removed this growth, which was carefully separated from the tendons beneath. They were fully exposed, but very little interfered with. A splint was used to keep the wrist-joint immovable, and the cutaneous wound healed by adhesion. The movements of the articulation were in no degree impaired.

The growth consisted of lobules of cartilage and small developments of bone of very delicate cancellous tissue, loosely held together by dense connective tissue. The separate growth above referred to, which felt like a cyst, was composed of fibre-tissue purely.

Plate II, fig. 1, is a copy of the drawing, ⁶⁵⁰; and the preparation is in the museum. The drawing, being coloured, of course shows the textural differences between the bone and cartilage better than the lithograph.

With the view to illustrate the osseous skeleton of some of the large cartilaginous masses developed about the pelvic bones, I have introduced a copy of a photograph made of a specimen, preparation 1132⁵², in the museum. The case was quoted in a former paper (vol. xii, 1866, p. 399). On Plate III, fig. 2, at the end of this communication, the dorsum of the ilium is displayed, *a*, with two large, coral-like growths projecting in high relief from it. The necessarily reduced size of the illustration detracts somewhat from the extreme delicacy and beauty displayed in the structure of the original, and without another view of the opposite side of the preparation, it was impossible to show how the venter of the bone is almost entirely encrusted by a continuation of that growth marked *d*, which springs from the crest of the bone. The almost circular, fungus-shaped growth, *c*, is perhaps the most attractive, and seems, on a profile view, as if traversing the thickness of the original bone.

A very characteristic feature of this specimen should be carefully noted. Nowhere do we observe any destruction of the original bone, such as is so commonly observed to affect bones surrounded by cancer, even when new bone may be developed concomitantly with that formation. We have to note a large amount of delicate spongy bone structure, but there are none of those excavations accompanying it which are always to be found in bones involved in cancerous growths. The student may compare preparation 1132⁵⁴ in proof of the above remarks. The ossa innominata present numerous excavations and hollows. Also similar disease in the bones of the cranium, preparation 1081⁴⁵, and of the scapula, preparation 1098¹⁰.

Even in the large mass of cartilage developed about the scapula, preparation 1098²⁵, related in my last paper (vol. xii, 1866, p. 403), the outline of the scapula was fully preserved in almost the centre of the new growth, so far as the section admits of its recognition.

Exostoses.—Of fifty cases of bony growths removed by my colleagues and myself since 1857, they were developed on the bones in the following proportions :

Head, frontal bone	1
Jaw, upper	1
Epulis on upper jaw.....	3
Jaw, lower	2
Epulis on lower jaw	2
Trunk, rib	1
Upper extremity, scapula	3
humerus.....	8
first finger.....	1
Lower extremity, femur.....	9
tibia	4
tarsal bone.....	1
metatarsal bone	1
ungual phalanx, great toe	12
sole of foot.....	1

Among these specimens were seen the usual varieties of such growths. The one developed on the frontal bone (of a man, 22 years old) was excised by Mr. Cock. It was of ivory-like hardness, and required great exertion on the part of the operator to detach it. The structure of the bone excised

resembles that of the bony growth, in the case reported by Mr. Hilton, which fell out from the region of the superior maxillary bone of a man where it had been growing twenty-three years.¹ It may be of interest to add that this man showed himself at Guy's in 1865, that is, about thirty years after the separation of the bone. He enjoyed as good health as privations permitted, and the only annoyance he experienced from the hole in his face arose from the disfigurement it occasioned.

Whilst upon the subject of these remarkable bone growths on the face, it may be useful to note a similar case reported by M. Michon,² in which one of three years' development, beginning in a male at the age of between fifteen and sixteen years, was successfully removed, not, however, without a great deal of trouble.

The jawbones, upper as well as lower, frequently have exostoses developed upon them. Most frequently, however, these grow from the alveolar processes, and, forming upon the gums tumours of remarkable appearance, have long enjoyed a special name which only identifies them with their situation. These outgrowths, or certainly most of them, if not all, are really exostoses. Proof in support of this statement I hope soon to afford. But bone, forming tumours, is met with growing out from the compact tissue of the horizontal ramus of the lower jaw. It is usually of the same structure as that part itself, and very hard. The only one I have seen had a broad base, and produced a fulness of the soft parts over it. Extending all round the inside of the lower jaw of a man between sixty and seventy years old, close to the necks of the teeth, which were perfectly healthy, I have seen several exostoses projecting into the mouth from about one eighth of an inch to a quarter in relief, some being sessile, others disposed to assume a somewhat narrow base and club-shaped or bulbous extremity. A small specimen of such an exostosis is seen on the palatine side of the posterior extremity of the alveolar process of the right upper jaw, above the last molar tooth, in preparation 1074¹⁵. Two rounded exostoses are there placed, projecting inwards about one eighth of an inch.

We possess in the museum some curious specimens of

¹ 'Guy's Hospital Reports,' vol. i, p. 493.

² 'Mém. de la Soc. de Chir. de Paris,' t. ii, p. 615.

exostoses developed on the outside of the cranial bones, as well as on their internal surface and in their substance.

The preparation 1074³⁰, of which there is no history (Plate IV, fig. 1) displays numerous large and extensive exostoses on the outer surface only of the occipital bone. They are central and lateral, running in vertical projections, with deep furrows between them. They are placed on the surface of the bone, between its two curved lines. The section shows the structure of the central exostosis. At *a* the bone is very compact and hard. At *b* the cancellous tissue is shown, which extends upwards in continuation with the diploe of the remainder of the bone. On the right side of the frontal bone of the same skull there is one small exostosis, and another at the junction of the right parietal and frontal. Both rise above the surface in low relief.

Specimen 1074³⁵ (Plate IV, fig. 2) shows a smooth, compact, somewhat pedunculated exostosis behind the foramen magnum. There is a deep furrow between it and the occipital bone. It measures $1\frac{3}{8}$ inch in its antero-posterior direction, about one inch transversely. The whole outgrowth may be divided into two parts, a larger posterior, *a*, and a smaller anterior, *b*. Between them the bone is furrowed. Its general outline is egg-shaped, and it projects in relief from the occipital bone about six eighths of an inch. The letter *b* indicates a smooth surface on the smaller division of the growth, which has all the appearance of an articular surface, being quite polished. It measures six eighths of an inch transversely, and five eighths from before to behind. In this last direction it is concave. It is probable that in the movements of the head this surface rubbed against the spinous process of the second cervical vertebra. A fact, to a certain extent resembling this one, is recorded by Mr. Toynbee, who showed at a meeting of the Pathological Society an abnormal articulation of the right jugular process of the occipital bone with the transverse process of the atlas.¹ Probably this was an exostosis from the jugular process.

I would here refer the reader to a most remarkable case of bony tumour developed from the occipital bone of a man who, in spite of the affection, attained the age of eighty years. It began to grow at six years of age. It was at the time of his

¹ 'Trans. Path. Society of London,' vol. ii, p. 93.

death of an oval shape, and measured 1 foot 11½ inches in its greatest circumference; from ear to ear, 1 foot 7½ inches; from above to below, 1 foot 9 inches. The weight of it was ten pounds. Its internal substance was bone, as hard as ivory, which contained cells.¹

A very remarkable deformity of the occipital bone, resembling an exostosis, may be seen in the specimen 1074²⁸. The projection might, during life, have been mistaken for an exostosis.

Passing to the frontal region, we find on a piece of a frontal bone, preparation 1074²⁹, a small exostosis projecting about a quarter of an inch in relief from the outer table, one inch above and slightly to the inner side of the centre of the left supra-orbital ridge. It must have been very perceptible during life, and might have been easily excised.

Another specimen, 1072⁶⁰, is a fine example of an osseous protuberance occupying the site of the centre of ossification on the left side of the frontal. The morbid condition associated with the external growth extends through the bone, although there is no internal projection. The elevation produces a thickness of bone of about six eighths of an inch in the thickest part, which is not the true centre. The vertical and lateral diameters measure three inches. The tissue of the growth is very hard, and resembles a mass of compact bone tissue. In the section this is quite white, and it forms a marked contrast with the yellow, greasy, cancellous tissue of the diploe between the tables of the skull at either end. The distinctive marks between diploe and tables are entirely merged in a uniform smooth surface, blending off, however, laterally into the ordinary arrangement of those structures in the cranial bones. It would have been extremely difficult to have removed any portion of this growth from a living person. The state of the bones is allied to sclerosis in other tissues, with the addition of excess of growth.

The only well-marked case of exostosis on the parietal bone I have seen occurred in a woman, sixty years old, about the region of its centre of ossification. It was one inch in diameter, about one fourth of an inch in relief, and had been observed twenty years. She complained of the shooting pain it caused.

¹ Bruns, Dr. V., 'Handb. d. Praktisch. Chir.,' 1ste Abth., s. 99; Atlas, t. i, fig. 9—11, 8vo, Tübingen, 1854.

But I must not omit to notice the remarkably fine specimen of exostosis from the right parietal bone, shown at the Pathological Society in 1850 by Dr. Quain and Mr. James Ilott. The patient died at the age of forty, of disease of the liver and kidneys. The tumour had been growing twenty-six years, and, therefore, commenced about the age of fourteen,—as the result, it is said, of a contusion. Its pedicle consists of compact tissue, its bulk of cancellous. The point of practical interest is, that it was really attached to the normal bone by a comparatively small pedicle, although its apparent base was very large.¹

Specimens of exostoses from the internal table of the bones of the skull are represented by the preparations 1073, 1073⁷⁵, and 1074. I have selected the last for an illustration, Plate IV, fig. 3. The two first were the calvaria of lunatics. The last was from a patient who had suffered from tic douloureux. This is a very fine specimen, and resembles, although it is far superior in the amount of new bone development, one in the Musée Dupuytren, No. 372, Atlas, Plate XV, fig. 5, of which there is no history. The bones are very heavy. The outer table is distinct in every respect. But the growth of new bone, consisting chiefly of cancellous tissue, springs from and is continuous with the diploe, all trace of the internal table being lost, except at the sides of the skull. The thickest part in the left frontal region measures three quarters of an inch; in the right frontal, half an inch. A fresh section has been recently made, which shows the structure of the new growth better than the lithograph represents it.

An early stage of exostosis developed on the nasal processes of the superior maxillary bones is shown in the drawing 4²⁸, which represents a man, æt. 60, with two swellings on either side of the nose. These tumours had been painlessly growing thirteen or fourteen years. They encroached on the nasal chambers and orbital fossæ of both sides.

This may be regarded as an earlier stage of that condition of the bones of the face of which there is a remarkable specimen in the Musée Dupuytren, No. 384, represented in a lithograph by C. O. Weber.²

¹ 'Trans. of the Path. Soc.,' vol. iii, p. 149, and plates ii and iii.

² 'Die Knochengeschwülste, &c.,' taf. v, fig. 7.

Also, in the museum of the Royal College of Surgeons of England, there is an example of a similar disease, 3236A.

Exostosis from the alveolar processes and laminae of the jaws.

—New growths forming on the gums of the upper and lower jaws, and termed “Epulis,” are not very uncommon. They often assume the appearance of “malignant disease,” especially when their surface becomes ulcerated, or when they appear to grow from the interior of the lower jawbone, and expand its walls.

But such growths are essentially exostoses, springing from bone; although, in many instances, pushing before them the overlying gum structure, they produce by irritation an excessive growth of that structure, and appear as a formidable disease. No wonder, then, that in former days severe operations were performed to eradicate such growths. Our museums contain numerous specimens, in which, together with the new growth, more or less of the jawbone, from which it was growing, was excised. On Plate II, fig. 4, the larger part of the horizontal ramus of a lower jaw is represented in section. It is copied from a drawing in the museum, 4^{56½}, and shows an “epulis” attached to the cancellous tissue of the bone. Also, a preparation (1091²⁸) displays even still better the relations between the bone and soft parts in this disease. Having examined a great number of these growths I may state that I have never met with any other tissues in them than bone, myeloid structure, and gum-tissue, that is to say, fibre-tissue, gingival glands, and a layer of epithelium more or less thick. The fibre-tissue is sometimes rather dense, almost fibro-cartilage. They are often rather vascular, more so than the tissue of the gums, and when ulcerated bleed freely. To their vascularity is due their bright red colour, so often leading to the supposition that the growth is cancer. As the source of the growth is its bony attachment, it is only necessary to cut this away freely, in order to cure the complaint. When the pedicle is attached to the surface of the alveolar process, or one of the laminae, this operation is easily accomplished; but, when the tumour springs from between the plates of the lower jaw, for example, a greater difficulty arises in its execution. To eradicate the growth it is then necessary to excavate the cancellous tissue of that bone.

The following cases show that these growths may be developed at the earliest and middle periods of life, but that they will be most frequently met with in early adult life.

As an explanation of the cause of their formation, that is to say, of the cause of the outgrowth of the bone, the history given by the patients would point to some source of irritation set up in the alveolar process by the extraction of a tooth, whilst at the same time it is open to the suggestion that the tooth might have been itself hurt or irritated by the presence of the growth in an early stage of its development.

There is only one method to be adopted to eradicate the growth. That is, excision. The operation must be carefully performed, great attention being paid to the complete removal of the piece of alveolus whence the growth springs. Against the old plan of excising a portion of the ramus of the lower jaw I can scarcely write too strongly, since the operation is one attended with great risk, and is perfectly unnecessary. Even the entire alveolar process, and some of the cancellous tissue of the ramus, might be excised before that operation should be done.

The earliest age at which I have seen a growth of this nature was in the case of a private patient, a female infant seventeen months old. It occupied the front of the gum before the second left incisor tooth of the lower jaw. The mother of the infant noticed the redness about six months before, just prior to the appearance of the incisor teeth. It had the appearance of a smooth wart, but was rather more vascular, and about one fourth of an inch in diameter and broad based. The tooth before which it grew was pushed backwards by it. The patient was otherwise healthy.

I excised the growth with a pair of forceps, having to cut through the bony pedicle by which it was attached to the alveolus. The soft parts covering the bone were fibre-tissue and epithelium.

Another case occurring at a later period of life than usual is reported by Mr. W. F. Croome, as follows :

“A domestic servant, *æt.* 37, first perceived a small tumour three months since on the left side of the lower jaw, springing from the gum around the first molar tooth. When examined it was about three quarters of an inch in its longest diameter, and

bulged inwards and outwards in the situation of the first molar, which was removed in consequence of the pain produced by the pressure of the tumour against it. The growth was excised by Mr. Birkett, September, 1853, cutting forceps being used to sever the root of the growth from the alveolar process." The bony pedicle was unusually firm in this case, and the soft tissue composed as before described.

In 1847, a single woman, æt. 22, applied to me on account of a vascular growth, which had been observed on her upper jaw about six months. It commenced as a small red tubercle between the first molar and bicuspid teeth, and had reached about an inch in width. The bicuspid tooth had been loosened and extracted. She was admitted into Charity Ward, and Mr. Cock excised the growth, which had a firm osseous attachment to the alveolus. A section showed a bony pedicle and fibrous tissue in which the cæcal terminations of the gingival glands were very apparent. The wound soon healed, and I know that the patient has never had any recurrence of the disease.

The elementary tissues termed "myeloid," which are commonly met with in new growths connected with the cancellous tissue of the bones, are also seen in these growths. An example of this kind occupied the left side of the alveolar process of the lower jaw of a woman aged twenty-three years. The tumour had been growing about fourteen months from the bony septum between the left bicuspid teeth, which were loosened and separated from each other by its pressure. It was softer than such formations usually are, and resembled very closely the appearance of an "epithelioma." It was, when excised, examined by Dr. Wilks, and he has given a drawing of the myeloid cellules observed in it in the volume of these Reports for 1856, pl. V, fig. 5. The growth never reappeared. Prep. in Mus. 1784⁵².

M. S—, æt. 26, a delicate, strumous, cachectic woman, was admitted under my care into Dorcas in May, 1854. She had been a hard-worked servant, whose labour had been too much for her strength. She was, however, possessed of great courage, and subsequently she displayed remarkable devotion to her duty as nurse in Charity Ward, which occupation she followed for between thirteen and fourteen years after the cure of the

complaint to be now described. Accidentally, about nine months before I saw her, she felt a small lump on the left side of the lower jaw. It slowly increased, and now occupied a large part of the left horizontal ramus of that bone between the last molar and first bicuspid teeth. It pushed outwards the external plate of the ramus, but did not affect the internal one, thus producing an unsightly deformity of the lower facial region. There was a firm growth apparently developed within the jawbone and rising out of it about three quarters of an inch, with an irregular grooved upper surface superficially ulcerated, but a smooth outer one formed by the expanded bone. It had never been very painful. The drawing in the museum, 272¹⁰, affords a very accurate representation of its appearance, as also does a cast made by Mr. Salter. Considering the growth to be innocent, that is to say, composed of fibre-tissue with a bony base, I proposed to myself its enucleation before subjecting the patient to the more formidable operation of excision of the affected part of the lower jaw. A preparation in the museum shows such a growth developed in the lower jaw, and it also demonstrates how very easily such a tumour might be enucleated.

In May, therefore, with a strong scalpel and a gouge, I removed as much of the tissue as appeared to be of new growth, cutting a tolerably hard bony base covered with fibre-tissue and gum. The operation was very painful and borne with great courage by the patient, who declined to take chloroform. The wound healed favourably, although upon one occasion I subsequently removed some tissue which had the appearance of being a small piece of the original growth. No further trouble, however, arose, and I had the satisfaction of seeing the patient for many years afterwards quite free from any fresh growth in the part. The outer wall of the lower jaw never entirely resumed its normal shape. The woman died in 1868 of phthisis, and circumstances prevented me obtaining an examination of the jaw.

The growth excised in this case was clearly an outgrowth of bone, as a nucleus, covered by an abnormal development of fibre-tissue. It was very firm, and neither so vascular nor so succulent as such growths occasionally are.

In this case we have an admirable example of the good which may be effected by confining the operative interference to the

new growth, exclusively. For, after an examination of several specimens of a like nature contained in museums, in which more or less of the jawbone has been cut away with the tumour, it is evident that the removal of the growth alone would have sufficed to cure the disease.

A domestic servant, æt. 39, was sent to me by my friend Mr. Buée, of Slough, in 1859. She had observed a swelling about the two last molar teeth of the left upper jaw after "toothache." One had been removed, since which the growth had appeared. It extended backwards, was about one inch in its longest diameter, and projected inconveniently into the mouth. Four months ago it prevented complete closure of the lower jaw. Its surface was soft and superficially ulcerated, its base firmly fixed to the jawbone. The tumour had been growing about one year. I excised it, but had to cut through its bony attachment. The wound healed, but in about four months another small growth had formed. This was carefully removed, since which there has been no reappearance of the disease. The first growth removed consisted of bone, fibre-tissue, and a layer of epithelium. Dr. Wilks was good enough to examine the disease and give me the following account of it. "The white surface of the specimen appears to consist of an epithelial growth arranged in a papillary form. The white structure immediately beneath this consists of a dense connective tissue containing nuclei, and which resembles fibro-cartilage. The red substance which is soft is an excellent specimen of myeloid structure, the large cells being remarkably well displayed. Within the latter is some bone." This patient has now been quite free from recurrence of the growth for nine years.

But the two most pedunculated alveolar exostoses I have met with occurred this year, one in private practice, the other in the hospital.

A gentleman, æt. 32, had the last but one left upper molar extracted on account of caries. His attention was drawn to a swelling in its site about twelve months afterwards. It never hurt him, but about a month before I was consulted he noticed a red swelling, and that the last molar tooth was being pushed

towards the cheek. Thus this exostosis had been in process of formation for two years at least. Its bony pedicle could be distinctly felt with the finger, and was supporting the soft tissues like the pileus, or cap of a fungus upon its stalk. It required more than usual force to cut through this bone, which when I examined it appeared to be quite perfectly well formed. Probably, it was the length of time it had been growing which allowed of the perfecting of this tissue.

Dr. C. O. Weber in an elaborate work devoted to osseous growths gives a beautiful illustration of a myeloid tumour, removed from the lower jaw, in which the development of spongy bone tissue extended into the tumour to a very unusual degree.¹

An alveolar exostosis removed by myself in December, 1868, from a patient in Martha Ward, was likewise well seen to grow from the transverse septum between the second bicuspid and first molar teeth. Preparations of these two specimens are in the museum.

Exostoses on the bones of the upper extremity.—Three patients have been the subjects of exostoses on the scapula—a boy twelve years of age, and two girls, one sixteen years old, the other twelve. In the first the growth had been observed four months, in the second three years, in the third one year. The tumours were small, and do not require any particular description.

Eight patients have had exostoses excised from the os humeri. They were four males and four females, all under twenty years of age, except one adult of forty. In one instance the growth was developed on a stump of the bone through which amputation of the limb had been performed. In the museum is a preparation of a femur stump, with an exostosis at its posterior surface close to the linea aspera, 1158⁵⁰.

A large exostosis is displayed in prep. 1100⁷, attached to the outer side of the shaft of the humerus by a broad base, and extending backwards, outwards, and upwards above the attachment of the deltoid muscle, through which it must have been easily felt. Exostoses are not uncommon in this region.

A remarkable lamellar exostosis is seen on the shaft of a right humerus, prep. 1100¹⁰; it grows from an expanded base partially

¹ 'Die Knochengeschwülste,' &c., 4to, Bonn, 1856, tab. v, fig. 1.

enveloping the shaft in front and on the inside. It terminates in a free, sharp, flat edge or crest. Corresponding as it does with the attachment of the upper fibres of the brachialis anticus, it might have arisen from ossification of some of its fibres.

A well-developed example of the supra-condyloid process on the inside of the humerus is shown in the specimen 1100¹⁵.

No case of true exostosis in the radius or ulnar appears in the list. They are very rarely seen on either bone.

Exostoses on the bones of the pelvis.—These bones, more especially the pubic division of the os innominatum, appear to be subject to outgrowths of bone as much as any others of the trunk, if we may regard as evidence of this fact the number of specimens thus affected. On Plate III, fig. 1, the left os innominatum is represented, prep. 1134⁶⁸. It is a very healthy and hard bone. From the visceral side of the horizontal ramus of the pubes a broad piece of bone descends, *d*, which, curving forwards, becomes united by a delicate forked process to the point of junction of the ascending ramus of the ischium and descending ramus of the pubes on the inside. At this spot there is no indication of any fracture of the bone. From the ridge between the spine of the pubes and the acetabulum there is a projecting exostosis, and at the junction of the ramus of the ischium and pubes on the outside more new bone and a crest, which last is not unlike an ossification in place of the tendon of the adductor magnus. There is no trace on the upper surface of the horizontal ramus of the pubes of a united fracture. The curious forked ramifications of bone appear to be ossifications of the obturator ligament.

Another innominate bone, 1128⁵⁰, is particularly interesting, as it shows a very large exostosis in the region of the spinous process of the pubes. It is broad based, and rough at its apex. On its inner side is a fossa which corresponds exactly with the site of the attachment of the adductor longus. Processes of new bone extend downwards to the inner or pubic border of the thyroid foramen, and encroach considerably upon its confines. The bone generally is light and spongy.

Whether this specimen may or may not serve as an illustration of a bony growth in relation with the "rider's-bone," or ossification of the tendon of the adductor longus, or magnus

muscle, it is of great interest in connection with a case I shall now relate. A gentleman, fifty-six years of age, was, in early manhood, much used to riding on horseback, and regularly hunted three days a week at the least, being always well up to the hounds. He has always enjoyed robust health, and is very muscular. Twenty-five years since, when riding in a steeplechase, at about the age of thirty, in the act of charging a fence his horse, refusing the leap, swerved, and he felt something give way "snap" in the upper and inner region of the right thigh. Immediately after he felt he had not his accustomed powerful "grip" of the saddle. In the evening, even so soon after the accident, the thigh was swollen and bruised. It should be stated that he was neither thrown from his horse nor displaced in the saddle. The muscles of the right thigh were very weak for some months afterwards; indeed, the adductors have never regained their wonted power. Both Aston Key and Liston were consulted, and stated that they had never met with a like case. For at this time there existed a bony hardness in the course of the tendon of the adductor longus.

At this time there is a large exostosis in the region of the right spine of the pubes, which extends along its horizontal ramus, and seems to envelope the pubic attachment of the adductor longus muscle. The tendon of this muscle is converted into bone at its root, and extending for three inches downwards in its substance a conical piece of bone is clearly perceptible. The apex of this is pointed, and rounded off at its tip as if cartilaginous. In the tendon of the left adductor longus there exists a similar bony deposit about two inches long, but no exostosis on the pubes. The other adductors are unaffected on both sides.

Dr. Billroth has described an ossification in the tendon of the adductor magnus, which he found in an after death examination of an old cavalry man. It extended in that muscle for half an inch below its attachment to the pelvic bones.¹

Prof. Longmore, C.B., of Netley, informs me that he has seen the "rider's-bone" "but extremely rarely."

A similar local ossification of the soft parts, due to pressure and irritation, is stated to occur in the left arm of the Prussian soldiers, and is termed "exercise bone."²

¹ 'Deutsche Klinik,' 1855, No. 27.

² Virchow, R., 'Die krankhaften Geschwülste,' Band II, s. 72.

Exostoses on the bones of the lower extremity.—Nine patients have had exostoses removed from the femur. Five were of the male sex, four of the female. Not one individual exceeded the age of twenty-seven years at the time, and five were under twenty.

The growths developed on the shafts of the cylindrical bones and termed epiphysial, or sometimes periosteal, are of very common occurrence, and usually grow from small contracted pedicles or long narrow stems. Of the first-named variety I have the opportunity of showing the construction through the kindness of Mr. Poland, who allowed me to make use of a specimen for that purpose. It is a typical one. He removed it from the inside of the lower fourth of the left femur of a healthy-looking girl, thirteen years old. Its age is from five to six years. On Plate II, fig. 2, A, the growth is represented as it appeared immediately after excision. At B we have a vertical section. As, however, the Description of the plate is sufficiently explanatory, I need not here dwell upon its anatomy. The student can refer to the coloured drawing in the museum, No. 15⁶³, and to the preparation, 1152⁵⁰.

Through the kindness and liberality of many contributors, our museum is singularly rich in fine specimens of exostosis on the femur.

As regards recent and young growths, the preps. 1152³², 1152⁴⁸, the last removed and presented by Mr. Parrott, of Clapham, contrast favorably as regards their different modes of attachment. The former is club-shaped at its free extremity, and has a small root; the latter has a very narrow, expanded root, and square shape. These varieties are both of them represented in the other dry specimens. See preps. 1152, 1152^{15, 16}, and 1152⁶⁴; 1160⁹².

The region of the femur at the root of the trochanter minor appears in two specimens to have been affected by those influences which contribute to the development of these outgrowths. Can this be attributed in any way to the attachment of the tendons of the psoas and iliacus muscles? The preps. 1368 and 1152⁵ of the upper quarter of two left femurs display exostoses growing from the bone and eclipsing every trace of the trochanter minor. The last is the finest specimen. I found it in the dissecting room some years since. It

was taken from a young male subject of rather feeble development. It has a broad root, and the body of it rises forwards for the length of four inches and a half. The anterior surface is grooved where the psoas and iliacus muscles lay in contact with it. The posterior surface is convex. At about midway between its base and apex there was a false joint, as if at some time it had been broken. Its apex curved under Poupart's ligament, above which it was perceptible through the abdominal walls. Cancellous texture composes the principal mass even on its surface.

But the largest specimen of the coral-like, pedunculated exostosis forms one of our illustrations, Plate II, fig. 5. It is as fine an example as it is possible to meet with, and presents a curious feature in the existence of a foramen, marked *f* in the drawing. This is produced by the outermost growth grasping the shaft of the femur and becoming implanted on its surface. I suppose the continued action of the vastus muscle must, by the pressure made upon the growth during its development, have led to the curious result described. A full description of this specimen is given with the plates. A similar mode of implantation may be seen in prep. 1151⁵⁰.

By the side of the last is another femur, fig. 6, which, at first sight, appears to have a similar coral-like growth upon it. This, however, is the osseous base or skeleton of a growth, associated, in all probability, with cancer. If we compare this prep. 1167 with another, 1160⁹¹, it cannot be doubted but that the above interpretation is the correct one. In the illustration a large quantity of the bony growth has been broken off at *a*, but the elongated, crest-like, osteophytic processes descending along the bone at *b* are very characteristic of osseous growth in the vicinity of bone cancers. This specimen is from a burial-ground, and therefore without a history.

A curious specimen of lamellar exostosis is seen in prep. 1151⁷⁵, a portion of a right femur, and in 1151⁷⁶, an entire bone. Both occupy about the central one-fourth, and are on the outer side. Both the exostoses have broad basal attachments posteriorly, and free, crested edges in front, with a terminal point directed downwards. A vertical section of the first one has been made which shows that the compact structure is considerably thicker than usual.

The specimen 1151⁷⁸ has a similar shaped exostosis on the inner side of its central third, which terminates below in a very sharp point quite free from the shaft for two inches.

When exostoses grow to a very large size they sometimes undergo the process of necrosis. A case of this kind occurred in the hospital many years ago in a man of middle age, who for years had had a tumour at the inferior extremity of the femur. The integuments had ulcerated from mere pressure, the femoral artery was implicated in the growth, and amputation seemed to afford the only chance of removing the local inconvenience. To this treatment he would not consent. The patient was under the care of Mr. Hilton, who, perhaps, some day may be persuaded to publish more complete details of the case.

Fracture of an exostosis from the bone upon which it grows is a circumstance of such rare occurrence that I am induced to cite a case recorded by M. Gosselin.¹ A man, æt. 51, had had a tumour on the left femur from boyhood, which was an exostosis. It had been broken off by a blow inflicted with a rough piece of stone, which, at the same time, made a small wound from which there was a considerable effusion of blood. The man died, and it was then found that an exostosis had existed on the inner surface of the lower third of the femur. On its external surface the exostosis was knobby and adherent to the vastus internus and adductor tertius. It was implanted on the femur by two points; the one inferior, larger, the other superior, and more narrow, and between these two points there was a space in which the femur was not adherent to the tumour. In this manner an arch was formed, a condition quite isolated and exceptional. The bony growth was crushed into several fragments, many of which were completely detached.

The reader will see by comparing the above description with the preparation of the femur, the subject of our illustration, Plate II, fig. 5, how closely the two diseases must have resembled each other in their chief features, the difference being only that one was growing on the outside of the femur and the other on its inside.

M. Chassaignac, in the same 'Bulletin,' page 417, relates an instance of the fracture of a femur and of the pedicle of an

¹ 'Bull. de la Soc. de Chir. de Paris,' t. vii, p. 414, 1857.

exostosis, which had existed for many years in the immediate vicinity of the seat of injury.

But one of the most remarkable cases in relation with a femoral exostosis is that related by Dr. Boling.¹ A male, æt. 16, had been suffering five or six months when Dr. Boling amputated the limb on account of an immense swelling occupying the leg and thigh. Its diagnosis was obscure, although some of the characters of aneurism were present. The patient recovered. The examination of the popliteal space showed that a conical point of bone projected backwards from between the condyles of the femur. It was about half an inch in length, and by it both the popliteal artery and vein were perforated.

Four cases of exostosis on the tibia have been operated upon; three were males, one female. All were under twenty years of age when the growth was observed. The usual place in which these growths form is immediately below the internal tuberosity. I have seen a case in which symmetrical development of an exostosis occurred in this part in an adult, and the commencement of it was accompanied by pain.

In the museum is a very fine specimen of a styloid exostosis, having a very sharp end, extending downwards from the posterior ridge of a left tibia. Its extreme length is two and a half inches. Slightly curved, it is directed outwards and backwards, the apex being five eighths of an inch from the shaft. The preparation 1215²⁵ was found in a male, aged forty-nine years. P. M. 1866, No. 363.

A very curious specimen, 1251, is a right tibia and fibula united together firmly by bone (synostosis) at their inferior extremities. There are stalactitic projections of bone from the head of the tibia behind, and a small exostosis from the neck of the fibula pressing against the head of the tibia. At the inferior extremity of the tibia posteriorly there is a pedunculated, knobby, spongy exostosis with grooves on its surface as for the lodgment of tendons.

Professor R. Virchow gives a beautiful illustration of these multiple exostoses developed on the cylindrical bones of the lower extremity of a male, ten years old.²

¹ 'North American Med.-Chir. Rev.,' 1857, p. 608.

² 'Die krankhaften Geschwülste,' Bd. II, s. 84, Berlin, 1864-5.

From a tarsal and metatarsal bone exostoses have been excised, but we may pass on to the description of a noteworthy case of an osseous and cartilaginous growth which covered nearly the entire dorsal and plantar regions of the foot.

The case is reported by Mr. Thomas Falcon, formerly residing at Bradford, York, nearly in the following words.

A man, æt. 32, by trade a weaver, of a leucophlegmatic temperament, said that the above exostosis first made its appearance about fifteen years ago, and had gradually increased to its present enormous size. The tumour completely envelops the whole of the foot, both on its dorsal and plantar surface, its circumference being about eighteen inches. That portion of the tumour situate at the internal border of the foot is slightly moveable on its base, and apparently cartilaginous or gelatinous in texture, but in the middle and outer part of the foot it is immoveable and osseous. There are two ulcerations on its dorsal aspect, from which spiculæ of bone have been extracted. The patient has never experienced pain, nor had any constitutional symptom indicative of the tumour being of a malignant nature. He had previously consulted three surgeons, who declined to remove the tumour, and said that amputation must be had recourse to. The patient objected to lose his leg, but was willing to submit to the removal of the tumour. From his history of the case I was led to infer that the growth of the tumour first commenced either from the cuboid or external cuneiform bones, or from the heads of the three outer metatarsal bones.

I gave it as my opinion that the tumour was attached by bone (and inseparable) only at the outer part of the foot, and that there would be a portion of the foot remaining, after the operation, sufficient for the support of the body and progressive motion. Having obtained the man's consent, I first removed the tumour in the manner hereafter described, and then a portion of the foot by the method described by Mr. Watton before the Medical Association at Dublin.¹

A description of the method of performing the operation here follows, which it is unnecessary to quote. Suffice it to add that the man recovered, and with a very useful member. Mr. Falcon informs me in a letter dated January, 1869, from Ful-

¹ 'The Lond. Med. Gaz.,' 1838, vol. xxi, p. 178.

neck, Leeds, that he subsequently removed a large mulberry calculus by lithotomy from this patient, from which operation he recovered.

Amputation of the four outer metatarsal bones and supporting tarsal bones was successfully performed by Mr. Key on account of injury.¹

The phalangeal exostosis of the great toe.—Thirteen operations for the removal of these growths have been performed; six on males, seven on females. In twelve instances the patient was between the ages of twelve and twenty-two; the thirteenth was thirty-nine years old. Within the last few weeks I have had a boy under treatment for this complaint, between eight and nine years old. It had been observed two years.

Sir Astley Cooper was the first writer to notice these growths on the ungual phalanx of the great toe. In 1818 he wrote: "Two instances of exostosis under the nail of the great toe, projecting considerably beyond it, have occurred in my practice; one of which occasioned so much pain and inconvenience to the lady who was the subject of it, that I was under the necessity of removing it; which I easily accomplished with a saw."²

Mr. Liston published a short paper on the disease in 1826, which, he writes, "so far as I know, has not been adverted to in any surgical work."³ It is illustrated with a plate, and the preparations from which the engravings were made are now in the museum at the Royal College of Surgeons, in London.

M. Dupuytren describes these growths and their appropriate treatment in a clinical lecture, carefully separating them from the cases of "in-growing toenail," as it is commonly termed.⁴

The drawings 24^{85, 91} and others show the ordinary appearance made by these growths. Springing from the ungual phalanx of the great toe, they push before them the overlying tissues, and produce irritation, by which these become thickened.

I have attempted in Plate II, fig. 3, to explain by means of a diagrammatic sketch the relation of such a growth to the neigh-

¹ 'Guy's Hosp. Reports,' vol. i, p. 265, 1836.

² 'Surgical Essays,' part i, p. 178.

³ 'Edin. Med. and Surgical Journ.,' vol. xxvi, p. 27.

⁴ 'Lec. Orales de Clin. Chir.,' t. 3, p. 412, edit. 1833.

bouring parts. The letter *a* points to a section of the phalanx; *b*, to the growth; *c*, to the tissue between it and the nail, which is sometimes fibro-cartilaginous. The line *d, d* indicates the course the incision should follow in order to excise it effectually.

It is unnecessary to give details of such cases as these at length. For their radical treatment and cure it is only necessary to excise the growth at its root. The amputation of the whole or part of the affected toe cannot be justifiable unless on account of some special reason. I know that authors recommend this treatment. Mr. Liston did. But experience derived from the observation of many cases enables me to state that excision of the growth alone suffices to cure the complaint. It may be very conveniently accomplished with a gouge, which should be inserted a little to the outside of the furrow which usually circumscribes the growth, and should be made to penetrate to the bone. The severance of the exostosis from the phalanx is then quickly and easily effected.

On the unguis phalanx of the little toe an exostosis is sometimes developed (see prep. 1287).

DESCRIPTION OF THE ILLUSTRATIONS.

PLATE I.

Copy of a drawing by Canton in the museum, Numbers 51, 52, representing a tumour of fifteen years' growth in the cervical region of a patient aged forty-eight years, removed by Mr. John Morgan in 1828. Cast 210, preps. 1541^{60, 61, 72}.

For a full history of the case see pp. 3 *et seq.*

PLATE II.

Fig. 1, drawing 6⁵⁰.—A growth of about eleven years' development removed by Mr. Birkett from the dorsal aspect of the left carpus of a lady aged twenty-two years. It was said to have commenced as a ganglion over the extensor carpi radialis.

Natural size.

A section of the growth is here delineated. *a*, nodules of cartilage; *b*, bone. These separate nodules were united together by dense fibre-tissue, of which tissue, indeed, there was one nodule entirely composed. To the touch, before the operation, this nodule felt like a very tense bursa, but it was quite solid, and without any trace of a central cavity.

Fig. 2, prep. 1152⁵⁰, drawing 15⁶³.—An exostosis removed from the inside of the femur by Mr. Poland, which had been growing between five and six years.

Natural size.

A. The outside of the growth.

a. The hard bony pedicle, from which (*b*) the periosteum has been reflected.

c. The cartilage.

B. A vertical section of the same growth.

*a*¹. Well-formed cancellous bone, with little marrow, having a thin layer of compact bone outside.

*a*². Very fine, loose cancelli, with much marrow.

b. Periosteum continuous with perichondrium.

c. Cartilage terminating abruptly.

d. Line of ossification between bone and cartilage.

Fig. 3. A diagrammatic sketch of a section of the second or ungual phalanx of a great toe, with an exostosis springing from its extremity and pushing up the toenail and sub-ungual tissues.

a. Section of phalanx.

b. The exostosis with an outer covering, *c*, of fibro-cartilage and the ordinary structures of the part.

d, d. The line in which the incision should be carried in order to cut off the exostosis completely from the phalanx.

Fig. 4. Copy of drawing, 4^{56½}, represents a section of the left horizontal ramus of a lower jaw, upon which a tumour described as "epulis" was growing. Natural size.

a. The new growth.

b. The continuity, by cancellous bone, of the jaw and the nucleus of the growth.

Fig. 5. Representation of prep. 1167⁵⁰, reduced. A left femur with multiple exostoses growing from the posterior surface of the lower part of the bone. There are two independent growths. One (*a*) has a contracted root (*b*) springing from the external linea aspera, and extending backwards and inwards it terminates in a coral-like head or crest, *a*. From the same root (*b*) a process ascends vertically to terminate in a sharp point, *c*.

Springing from the outside of the bone is a much larger mass (*d*), the root of which (*e*) extends from an oval-shaped foramen (*f*) to the outline of the femur. The growth passes round the outside of the bone and appears either to have joined with its anterior surface, or to have coalesced with another growth in the front. By this arrangement a foramen, or arch, is formed between the original shaft of the bone and the root of the new growth. It is a specimen from a burial ground, and was presented, in 1826, by Mr. William Jackson, of West Bromwich.

Fig. 6. A right femur, prep. 1167, which has, at its superior extremity, the osseous foundation of, probably, a cancerous growth. The upper division, *a*, has been much broken, or the growth decayed. The specimen is, doubtless, from a burial ground. The lower division, *b*, spreads over the posterior and

lateral surfaces of the bone, forming crests or ridges, the peculiar arrangement of which, in linear processes of extreme delicacy, osteophyte, is characteristic of its association with another morbid growth, and not simply bone. The student will, at once, see the resemblance between the outgrowths of bone in this specimen and one in which it is certain cancer existed with a like growth, if he carefully examines prep. 1160⁹¹.

PLATE III.

Fig. 1.—An os innominatum having exostoses developed on the horizontal ramus of the pubes and its descending ramus, with osseous ramifications crossing the thyroid foramen. Prep. 1134⁶⁸.

a, ilium; *b*, ischium; *c*, symphysis pubis; *d*, the exostosis. (See p. 26.)

Fig. 2.—Part of an ilium, upon which a large bony and cartilaginous growth was developed. This is a posterior view of the bony fabric of the tumour. Prep. 1132⁵².

a, dorsum ilii; *b*, acetabulum; *c*, bony growth, which extends through the substance of the original bone; *d*, a coral-like bony growth on the crista ilii. (See p. 14.)

PLATE IV.

Fig. 1 represents the section of a skull (prep. 1074³⁰) found in a churchyard. It is that of an adult, probably a male, and has numerous large and extensive exostoses on the external surface of the os occipitis. There are two smaller exostoses, one on the os frontis and the other at the union of the right parietal and frontal bones. (See p. 17.)

a. Very dense compact bone.

b. Cancellous structure continuous with the diploe above.

The exostosis is an outgrowth from the external table of the occipital bone. Compare Plates II and III, fig. 1, 'Trans. of Path. Soc.,' vol. iii.

Fig. 2. An exostosis behind the foramen magnum (prep. 1074³⁵). (See p. 17.)

- a.* The body of the bony growth.
- b.* That which appears to have been an articular surface in contact with the spinous process of the second cervical vertebra.

Fig. 3 represents the prep. 1074. The interior of the calvaria is seen covered with large tuberos bony growths, especially the frontal bone. (See p. 19.)

At *a* the section shows the increased thickness of the inner table.

Since this drawing was made the section of the bone has been rubbed smooth. Its structure is consequently more defined, and it is very curious.









